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ABSTRACT

This paper responds to the demand generated among competency-based program participants and administrators for definitions of "competence" and new assessment techniques and instruments for its measurement. Discussion centers on three aspects of assessment: (1) the identification and definition of competencies relevant to life and work outside of academia; (2) instrumentation, techniques, and processes of evaluation that provide reliable and valid measures of these competencies; and (3) standardization and/or establishment of levels of performance necessary and sufficient for awarding credentials. Technical problems in these three areas are identified, and directions for future research and development are suggested. Discussion strongly advocates an emphasis for competency assessment and identification that centers on adult development and learning outcomes with special attention to the interactive nature of psychological variables and how skills and abilities are integrated (as is required in life outside of academia). A "psychology of competence" is predicted. (HM)

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COMMENTS AND GUIDELINES FOR RESEARCH IN COMPETENCY IDENTIFICATION, DEFINITION AND MEASUREMENT

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I

INTRODUCTION

The following paper takes as its point of departure the demand being generated among competency-based programs for definitions of "competence" and new assessment techniques and instruments for its measurement.

Many competency-based practitioners believe that traditional approaches to student evaluation (e.g., multiple choice paper- and pencil-tests and written papers) are not suitable devices for assessing student progress in many spheres of activity of interest to them. They are, therefore, engaged in developing new techniques and are calling upon psychometricians to assist them.

These educators might have been content to simply define or redefine institutional and program goals, charge the faculty with their adoption, and not concern themselves with testing. Instead, in many cases, a superstructure of student assessment is being introduced (in two- and four-year postsecondary programs) in which faculty evaluations of students at the instructional-unit level play only a partial or minor role, if any role at all. Even where such a superstructure is not introduced, faculty are being required to state explicitly the criteria upon which student achievement will be judged, and some sort of monitoring and assistance system is being introduced to assure the appropriateness (relative to the instructor's goals) of assessment instruments and criteria of evaluation employed. Why?

The fear is that unless these steps are taken, the time, effort, and money spent in formulating or reformulating program goals will have been wasted--that things would not change much if they changed at all. This is unacceptable since most competency-based practitioners have energetic reform agendas. The reasoning behind their pessimism (about the likelihood of changing the form and content of education without

changing the form and content of assessment) is akin to the following:

(1) Faculty habits of instructing (content focus, skill emphasis and pedagogical techniques employed) are not changed by simple requests or eloquent supplications.

(2) Where program-level tests exist which supercede the assessments individual instructors devise, there is a tendency to teach to such tests (or at least worry about the consequences of not doing so).

(3) Given tests in courses or at other levels of a program, students tend to gear their studies to these tests.

(4) Therefore, if faculty are to change their habits of instruction and students are to change the focus of their attention, then "tests" students are required to take must emphasize dimensions of ability commensurate with the avowed goals of the institution, program, or particular instructor.*

What explains the equally strong emphasis on goal clarification and operational specification? Why the phenomenon of old and new institutions busily engaged in formulating new goals or resurrecting and polishing up old ones?

Many of the new competency-based institutions or programs in universities are geared to special populations such as women, racial or ethnic groups, adults, or future occupants of particular occupational roles. Some of the old institutions wish to attract these same special populations and to attract a greater number of "traditional" students. Moreover,

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*Of course, several other explanations are possible including following the leader: "That's what all the other competency-based programs do--don't ask why?" Or, "we don't trust the professors here with grading students. They want to give everybody an 'A', and we won't have it! The efficacy of our degree is at stake." But, at this point in the history of competency-based education the explanation outlined above seems most plausible.

events and emergent ideologies of the past decade and a half or so seem to have produced a great zeal for educational reform at all levels of the system. Attention, therefore, is being given to what sort of education will be offered: (a) to attract new student populations, (b) to continue to attract the traditional student population, and (c) to satisfy the reform agendas of program founders. This leads to a discussion of educational goals.

As explained in the commentary accompanying this set of papers, somewhere in the course of planning for change, many institutions have adopted the name "competency-based." In the process of translating broad educational goals of the institution into concrete programs and curricula, "goals" have come to be interpreted "competencies" or "performance objectives."* When the focus becomes "competency," the following questions are raised:

(1) What does it mean to _____ competently or to be a competent _____?

(2) How do we determine whether students can _____ competently or whether they are competent_____s.

(3) What do we do as educators to promote these kinds of competence?

As already discussed, the answer to the second question (and a partial answer to the third) has been: "We assess the students. We ask them to perform competently for us."

Undertaking the development of assessment criteria, techniques and instruments and arriving at decisions about appropriate programs compels

*Some competency-based educational practitioners have recognized that many important "goals" of education do not translate into "competency" objectives and that care must be taken not to equate the two; others have not. This can have significant consequences for the curriculum and environment of the institution or program which emerges from educational plans.

attention back to the first question and, of necessity (with respect to assessment), to the operational definition of "competence" or "competencies."*

The paper which follows, by Paul Pottinger, emphasizes a need for systematic empirical research in connection with competency identification, specification, and measurement. It identifies technical problems in these areas and promising directions for future research and development. The paper strongly advocates particular approaches to competency identification, specification, and measurement requiring systematic empirical investigation and verification; and, in doing so, it presents an indirect critique of the current state of the art in these areas. It will be difficult for those who lack the contrast class of present realities--a working knowledge of what is and is not being offered to assist educators in identifying, specifying, and measuring competence--to fully appreciate the recommendations in this paper.

Sheila M. Huff

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*The latter term, "competencies," is used variously to mean "component elements of competence" and "areas of competence." There is considerable semantic confusion in the emerging technical language of competency-based education and a good deal of unnecessary linguistic invention that makes many familiar ideas sound foreign and, to some, offensive.

II

PROBLEMS, ISSUES, AND GUIDES FOR RESEARCH

The problems stemming from the identification and definition of competencies and subsequent problems of their measurement are at the core of many difficulties reflected in the current state of the art of competency assessment. Specifically, there are three aspects of assessment upon which this paper will focus:

- The identification and definition of competencies relevant to life and work outside of academia;
- Instrumentation, techniques, and processes of evaluation that provide reliable and valid measures of these competencies;
- Standardization, and/or establishment of levels of performance necessary and sufficient for awarding credentials.*

The reader should bear in mind that these major assessment issues are complex and interdependent. Therefore, the following sequence and organization of major topics and their corollaries are somewhat arbitrary, at best. However, some broad parameters follow which hopefully will guide researchers.

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*There are other considerations that should be taken into account in the development of new competency definitions and measures which, for most postsecondary institutions, have great enough importance to be kept keenly in mind by competency specialists. These include: (1) cost/effectiveness, (2) didactic or pedagogical values of measures, (3) ease of interpretation, (4) efficiency of use, (5) psychological impact of taking these tests. These issues will not be major topics of concern here; suffice it to say that new measures should be economical with respect to both faculty time and institutional financial resources, since measurement techniques, instruments or procedures which require large amounts of time and financial resources will have limited appeal and practical application. Similarly, measures which lack face validity carry a threatening mystique to those who do not understand them, especially if they lack clarity in their correspondence to specific goals.

A. Identification and Definition of Competencies

Corollary 1: "New" competencies must be identified and operationally defined.*

There are many outcomes of learning not functionally equivalent to those upon which credentials are normally awarded and which often have greater legitimacy with respect to national educational priorities for all students than traditionally rewarded scholastic and athletic ability. Although widely accepted (and validated as important in occupational and life success by a growing body of empirical evidence), there has been a failure to identify, operationalize, measure, and award credit for many of these learning outcomes. Some of these include such intuitively accepted ingredients of success as the ability to relate to others effectively, to empathize with others, to engage in moral reasoning, to accept responsibility, to persevere, and to analyze, synthesize and strategize in problem resolution.

The development of these abilities and their concomitant behavioral dispositions is usually not a subject of academic planning, although they do continue to develop (or cease developing) in the environment of colleges and universities and are of concern to many instructors and administrators. As Keeton (1974)** points out:

> ...although achievement of such skills is often an avowed aim of the most traditional liberal arts colleges it is rarely certified by their credentials, and is often disavowed by instructors as something which cannot properly be expected as an outcome for which they can rightly be held accountable.

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*To operationally define is to say what behaviors will be taken as evidence that a student has a given ability. The meaning of the ability, for operational purposes, becomes the criteria by which the ability is verified. For example, the meaning of "ability to communicate effectively," for operational purposes becomes: "the student can write papers meeting the following criteria:..." and "the student can deliver speeches meeting the following criteria:...," etc.

**Full citations appear in the "References," pp. 26 to 27.

Many competency-based programs enter these and other "neglected" abilities on their list of desired learning outcomes for students. These programs wish to promote the development of these abilities in the curriculum and institutional environment and to assess and credit student progress in developing these abilities. If this were accomplished, it would provide nontraditional students with an opportunity to pursue credentials in areas relevant to their lives which traditionally have not been a basis for the conferral of degrees.

Corollary 2: <u>New competencies should have general significance to a wide variety of career and life outcomes</u>.

(a) <u>The Problem of Reductionism</u>

Competencies cannot be meaningfullly defined by seemingly endless reductions of specific skills, tasks and actions which, in the end, fall short of real world requirements for effective performance. In fact, the more essential characteristics for success will often turn out to be broad or generalized abilities or characteristics which are sometimes more easily operationally defined and measured than an array of specific "subskills" which do not add up to a general competence.

In many competency-based education (CBE) programs, attempts are made to reduce competencies to a series of discrete and hopefully quantifiable action steps. This reductionism follows from the need to clearly communicate as well as to quantify and measure outcomes. However, from the students' point of view, a myriad of overly reductive definitions is awesome, and the definitions, themselves, often lack intuitive meaning; i.e., the "overkill" of subcompetencies lacks the same sense of meaning and relevance to students' lives as the traditional learning agendas from which many have fled. To the student who asks, "What do I have to be able to do to be competent; what do I have to demonstrate in order to be credentialed; and what do these exhibited abilities have to do with the real world?," the

current state of the art in defining competence sometimes affords a regrettably inadequate answer.

From the instructor's point of view, too, such definitions seem to have forfeited what was important in the institution's educational goals. Many instructors justifiably resist demands to teach "competencies" that are too specific, narrow, or intuitively and empirically of minor importance in life.

Knott (1975) has addressed this issue:

> ....Competence as a goal of liberal education refers to an overall characterization of the individual rather than to the possession of discrete competencies.
>
> Mastery of a set of specific competencies does not necessarily produce a liberally educated person. Specific competencies must be synthesized or integrated into an effective whole which is more than the sum of the parts. The concern of liberal education refers to the competence of the person rather than the collection of possibly unrelated competencies. ...the emphasis in assessment of students in a competency based liberal education is holistic rather than fragmented. If assessment criteria and procedures do not reflect this emphasis and focus instead on specific unintegrated competencies, the primary goals of liberal education may be, at best, casually overlooked or, at worst, systematically ignored.
>
> (For further elaboration of this point, see section on the problem of interactions, p. 20.)

(b) <u>The Problem of Action-Orientations</u>

Although Knott expresses concern that competency-based assessment not subvert the basic intent of "liberal education," his point is well taken for more career-oriented programs where the specification of narrowly defined behaviors are, for the most part, equally inadequate in preparing

people for work.* Educators in career-oriented schools have often turned to the methodology and assessment techniques developed in industrial psychology, but most of these techniques exclude broad dimensions of ability vital to the performance of most occupational roles.

According to McClelland (1974), current approaches to educational preparation for jobs, based on the type of job analysis most widely practiced, have serious deficiencies at the theoretical and practical levels which have not been widely recognized (e.g., Fine and Wiley's [1971] analysis for the Directory of Occupational Titles). The initial assumption of this approach to so called "job function analysis" is so severely limiting that it simply might as well be labeled "incorrect." Example:

- "A job is made up of a series of tasks."
- "A task is an action or action sequence."

The action orientation of this approach has blinded practitioners to competencies which are absolutely essential to many jobs. The job function analysis approach is based on motor skills' analysis and has utility in their identification; but it is too narrow an approach to be used as a method for determining significant dimensions of job competence.

This approach to job analysis results in taxonomies of hundreds, sometimes thousands, of motor skills connected with particular kinds of jobs.

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*While this paper's focus is primarily upon job preparation, it is so only for convenience of analysis and discussion. There is undoubtedly considerable overlap between abilities required for competent performance in jobs and abilities required for other of life's activities. Simply consider typical liberal arts' goals of art appreciation, cultural awareness, and social sensitivity and you will find jobs where these qualities are highly valued.

These taxonomies are frequently used in developing the curricula of occupational education programs. For other reasons besides the neglect of many significant areas of job competence, such taxonomies are not suitable guides for educators. For example, there is a considerable risk of forgetting that many--perhaps in some cases, most--of these skills can be picked up on the job in a short period of time and are therefore not worthy of attention in educational programs. Curricula would be more relevant if they addressed a variety of more general abilities essential to competence.

Corollary 3: New competency definitions and measures developed for their assessment should be easy for faculty and students to comprehend and view as meaningful and useful.

New competency definitions should be readily recognizable as important, and the related assessment techniques or instruments should be easy for faculty and students to understand. There is a need to guard against competency definitions and measures that are so complex, trivial, or esoteric that students and faculty cannot, in the first instance, understand them and, in the second, accept them as meaningful and useful. In other words, educational goals should not be rendered unintelligible; and assessment procedures and instruments should not mystify the process of evaluation of student progress. Avoiding these pitfalls may require the participation of "non-experts" in the field-testing and review of proposed definitions and assessment measures.

Corollary 4: Competencies should be empirically linked to external realities.

Many educators take it as obvious that such things as the ability to master new bodies of knowledge quickly and effectively, to analyze and solve problems, to develop new skills efficiently, to utilize knowledge, etc. (and the capability of integrating these abilities) are critical if individuals are to take advantage of life's opportunities and surmount its difficulties.

Unfortunately, even though students might assent to the importance of these abilities, in their eagerness to develop "marketable skills," they may not see such abilities as saleable. And although these kinds of ability may indeed make the difference between those who do and those who do not advance in a career and may, indeed, be highly valued by employers, a growing number of students do not believe that to be the case. Students, especially in times of high unemployment, often have their eye on getting a job; see that they need a credential; think employers prefer technical credentials; and look to the quickest route to a credential through a program with very circumscribed knowledge and skill objectives. School administrators often respond in kind, leaving many faculty members out on a limb--unable to demonstrate, and even sometimes to articulate that much of what they do promotes general abilities that are, perhaps, the most "marketable of skills" and most valuable of abilities in terms of future growth and flexibility.

What is needed are measures of these general abilities and their interactions which show they are related to important life outcomes. Only when we know what makes the difference between adequate and inadequate performance, based on empirical analyses of jobs and other life activities, will we be able to develop or improve these measures, clarify new competencies, and value credentials based upon them.

The lack of empirical data about what constitutes competence is well illustrated by the current selection and evaluation procedures of professional schools. While the debate about the effectiveness of aptitude tests for selecting and evaluating students who will perform well in law, medical, and business schools goes on between academicians, psychometricians and the courts (e.g., the DeFunis case), virtually none of the participants have addressed themselves to the question of how well these tests predict successful occupational performance or competence. There is an abundance of empirical evidence which shows that doing well on these tests or in subsequent schooling does not predict success on the job.

Perhaps those who support the Medical College Admission Test, the Law School Admission Test, and the Admission Test for Graduate Study in Business as significant predictors of academic performance miss the point. We need to discover the skills, abilities and other characteristics critical to competent, post-academic professional performance and develop reliable and valid measures of these variables to supplant or supplement existing selection, assessment and evaluation tools. Until we do, we will continue limiting access to professions to only those who can demonstrate high achievement on a narrowly prescribed set of cognitive measures deemed essential for academic performance alone; while most often, it is abilities like those listed above and characteristics such as motivation, perseverance, dedication and integrity that separate the more competent professionals from the rest of their colleagues.

B. Instrumentation, Techniques and Processes

Corollary 5: We need to discover new ways of measuring abilities (competencies).

They must be new, not just new names for traditional procedures. Achievement on traditional paper-and-pencil, objective tests correlates highly with performance on all similar types of academic achievement tests; but if the desire is to break out of this closed circuit, there is a need for radically new types of "tests"--tests of learning, critical thinking, problem solving and other newly defined competencies which correlate with competent performance in jobs and other nonacademic situations.

(a) New Approaches

Within the competency-based movement, many innovative approaches to assessment are being developed, many of which borrow from techniques and procedures developed by industrial psychologists. For example:

- portfolios
- journals
- juries
- committees
- life histories
- self-assessments
- supervisor, peer and/or client ratings
- in-basket tests
- work sample tests
- games
- simulations
- projects
- contests
- rehearsed performances

These attempts to break away from the limited traditional measures of verbal ability and scholastic aptitude and achievement have sometimes resulted in elaborate, time-consuming, costly and cumbersome techniques and procedures; and most of these assessment techniques are quite subjective. They are not amenable to standardization for comparability among individuals and institutions.

The major effort underway by ETS (Cooperative Assessment of Experiential Learning--CAEL) to develop new procedures for measuring performance related to a variety of competencies is one attempt to break away from traditional measures which are method bound, limited in scope, and of no demonstrable relationship to competent performances outside of academia. CAEL's emphasis on performance measures of learning outcomes is, in itself, a sound approach. However, these new measures suffer from some of the same shortcomings of traditional tests. That is, (1) the techniques tend to be highly subjective and open to broad interpretation; (2) they do not easily lend themselves to standardization across institutions or even among individuals who use them; (3) there is as yet little or no <u>empirical evidence</u> that the performances being measured are any more related to success outside of academic than performances measured by traditional means. Moreover, these new procedures and techniques do not appear to lend themselves to rigorous empirical reality testing.

Until a host of measures are developed that are reliable, valid, standardized and rigorously demonstrated to be directly linked to significant life activities, evaluations and credentials based upon these new performance measures will have little meaning beyond particular institutional settings and will, therefore, not gain wide acceptance.

There are few examples of empirically derived competency measures (which have also been adequately linked to successful performance in work and life), but brief comments related to some that do exist follow.

(b) Psychomotor Skills

The most advanced state of the art is in the area of psychomotor skills. The Human Resources Research Organization (HUMRRO), for example, has accomplished a great deal with its technology and has collected a vast amount of interesting data. However, as previously pointed out, psychomotor measures are of limited utility with respect to CBE.

(c) Cognitive Abilities

Cognition has received much attention by researchers and educators. Traditional tests of critical thinking, analysis, and problem solving have sometimes been valid and consistent with stated learning goals, but these goals have been mostly determined on *a priori* grounds and thus limited with respect to their demonstrated relevance beyond academia. For example, not all educators realize (or act as though they realize) that the ability to store knowledge (which most tests measure) is less critical than the ability to utilize it. Similarly, the ability to recall information may not be so critical for many life functions as, say, the ability to acquire new information quickly.

Some of Klemp's (1974) thoughts on the matter are illustrative:

> In our daily lives we are constantly called upon to process various kinds of information, to analyze its components, to associate this new information with that which we have stored away in our memory, to partial out the crucial information from the trivial, and to integrate this information into our cognitive structure. In this way we constantly use information from many sources to solve problems, and in the process we learn new things about our world and ourselves. It would serve us well to ask the extent to which a multiple choice or true-false test has any bearing on what people do in real life and on the competencies that they possess. In truth, people are almost never asked to recognize a correct answer among a list of three or four alternatives. Rather than being reactive to such a well-defined situation, people must be pro-active in situations which provide only partial information.
>
> The one thing most traditional testing methods have in common, regardless of what they purport to assess, is this: they measure only one's ability to retrieve information after it has been stored. And many such methods fail even in this; a multiple-choice test, for example, measures the ability to recognize rather than recall. Essay tests are very subjectively scored, even when there is only one "correct" answer or line of reasoning as is often the case. Storage and retrieval of information are not the important issues for a competency-based program of study--nor should they be for traditional programs. Indeed, Ebbinghaus demonstrated many years ago that seventy percent of what is learned in the classroom is forgotten within one year. Rather, the issue is a more substantive one: how is the knowledged gained in course work used to come to grips with practical problems of living.

Implicit in this, according to Klemp, are three related issues of particular importance: how able are people in processing new information for problem solving; how able are they in integrating this information to form new solutions; and how effective are they in implementing these solutions. Klemp and his colleagues are developing innovative measures of these critical cognitive skills which should have wide applicability in traditional as well as CBE programs.

Others have attempted to define critical dimensions of cognitive competence. Knott (1975), for example, proposes three clusters of abilities as desired outcomes of an effective liberal education: (1) the ability to formulate and examine purposes; (2) the ability to design and act upon means of

executing those purposes; and (3) the ability to assess consequences for themselves and others of designed action on selected or formulated purposes.

Aubrey Forrest (paper undated) of Minnesota Metropolitan State College has identified three broad dimensions of competence: knowing, applying and evaluating.

Although these and other domains of competence appear among CBE objectives, there are no existing measures of them that have construct and/or empirical validity, reliability, or criterion levels linked to performances which represent occupational or other life competencies. However, the research underway by Klemp in developing such measures and in relating them to performance outside of the academic world should provide replicable models for developing new cognitive competency definitions and measures.*

(d) Interpersonal Abilities

Very little attention has been given to the measurement of interpersonal dimensions of competence. The following work is among the most promising done to date:

(1) In a study of U.S. Information Officers, McClelland (1972) found that more successful officers scored higher on a measure of nonverbal sensitivity derived from the PONS test by Rosenthal et al. (1974). These individuals were better at identifying the emotions expressed in content-filtered speech; and this ability was found to correlate with an understanding of how audiences would react to various media presentations. The latter kind of understanding —labelled "empathy"--was found to be critical for the competent performance of this job; and part of the PONS test apparently measures it well.

* Another example of research worthy of analysis is that being done under Dean Whitla of Harvard University. Harvard's Project Value Added is utilizing some interesting new competency-based learning outcome measures to evaluate the effects that three college programs have on students according to freshmen/senior comparisons on these new measures.

(2) In an analysis of human service workers and police officers, McClelland (1971, 1974) found that observational abilities are of major importance--particularly in social situations. He prepared filmed incidents in which people were asked to identify and correctly report what occurred and make judgments about what they would do in the situation. Learning to observe and interpret human behavior is an important outcome of many educational experiences, but it is rarely measured objectively or credited.

(3) Stewart (1975) has developed a measure of proactive style. She demonstrated that, for women, a proactive disposition is increased by some colleges. However, it was discovered that increases in the ability to be proactive may create a fear of success in women who, as a consequence, become less able to pursue their chosen careers. Stewart's is the only work in this area that has actually linked fear of success to actual career patterns of women. Jacquelin Flemming (1974) of Radcliffe College has been leading the research on fear-of-success as it applies to Blacks.

The continuing research of Stewart, Flemming and others should prove fruitful ground for identifying, operationalizing and measuring a variety of variables important to successful life activities and amenable to development or change through education.

(4) The problem of adequate selection of medical school applicants is similar to that of evaluating student learning, especially when one's goal is to select applicants who will not only do well in medical school, but who will also make good practitioners. It has long been suspected that traditional selection procedures have been inadequate; measures such as undergraduate grades, MCAT scores, background and interview ratings of applicants, and other such measures bear little relation to whether an applicant will eventually be a competent doctor from either his own standpoint or the standpoint of the patients he serves. Recognizing these problems, the Association of American Medical Colleges (AAMC) is sponsoring research and development of competency measures that relate to socio-emotional, motivational, moral, and behavioral outcomes as well as more traditional cognitive variables in learning.

The methodology in this new research will move beyond the often used industrial psychology model that typically prescribes a list of selected areas of knowledge, skill, ability, or personal qualities derived exclusively from audits, surveys, questionnaires, or task analyses. For example, systematic analyses of critical incidents of success and failure

will be performed to reveal patterns of behavior, skills, and especially other characteristics (e.g., non-cognitive, socio-emotional, personal qualities) that workers and experts themselves are unable to report as important to success. Going beyond traditional reliance on expert testimony or self-reports is necessary because most people have an incorrect or very limited understanding of (and ability to articulate) the elements of their work that lead to successful performance.

AAMC's research might well provide researchers with another model for identifying and measuring new competencies that are empirically linked to successful postacademic performance.

C. Standardization or Establishment of Levels of Performance

Corollary 6: Standards of performance for awarding credentials should acknowledge levels of performance required for entry into roles outside the academic setting.

The determination of criteria or standards of competence is one of the most difficult problems to be addressed. In every case, whether standards of competence of new or more traditional outcomes are determined, appropriate levels should be established by empirical evidence sufficient to ensure that they will not be viewed as arbitrary. Many educators have been satisfied with a priori judgments of what skills and levels of performance are adequate. It is startling to realize how much we accept the face validity of credentials and how little we really know about the correspondence between abilities and levels of performance these credentials represent and what in fact is needed for adequate performance in life's tasks. We have no sound benchmarks for evaluating the standards and offerings of postsecondary institutions.

(a) The Problem of Maximum Levels

Credentials are often restricted to those whose scholastic performance and/or test scores are higher than minimal levels required for work or other

social roles. Such occurrences discriminate unfairly against those who are competent to work, for example, but who are selected out of occupational opportunities by those who believe in the simple equation: higher academic achievement means better work or life performance. The tacit assumption that superior abilities in all measured characteristics are necessary or even desirable for performance is highly questionable.*

While it makes sense to require minimal levels of proficiency for many competencies, ability levels over and above necessary cut-off points do not always correlate with overall performance.

For example, in a job analysis, McClelland (1974) found that a minimal level of organizational or clerical competency was necessary for human service workers in the Massachusetts Civil Service system, but high scores on these measures were negatively correlated with superior job performance. Selecting people by rank according to score not only discriminated against those whose scores were adequate (sufficient) though "uncompetitive," but the process failed to select the better job performers as well. This finding and others** suggest that going beyond sufficient levels of competency in awarding credentials can be very dysfunctional for society--not only in terms of equity, but in terms of meritocracy as well.

In many job situations, where cognitive and other competency measures are used to select job applicants, even if job relevance of the characteristics being tested for can be demonstrated (e.g., "verbal ability" in human service workers), level of sufficiency for competent job performance is rarely evaluated or known.

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* A simple motor skill example will demonstrate this point. We know that an automobile driver must grip the steering wheel with enough force to maintain control of the car. But beyond a certain level of pressure, added strength in holding the wheel does not increase overall driving competency. And this is just one of some 3,400 discrete behaviors identified by researchers as making up the task of "driving."

** A recent study at Harvard revealed that the past SAT scores of faculty members were negatively correlated with more successful teachers. (Whitla, personal communication.)

We need more empirical research to establish minimal levels of competence required for quality performance based on how workers in the field perform on various competency measures.

(b) The Problem of Interactions

Researchers have long recognized that the interaction effects of variables are quite often more significant and meaningful than individual variables taken alone. It was stressed earlier, in quotations from Knott and Klemp, that competence is not a simple summation of discretely defined skills and abilities. This is readily seen in the example of driving ability. Although one can identify many skills necessary for safe and effective driving--including attitudes, cognitive skills, and emotional factors, as well as perceptual and motor skills--it is intuitively obvious that a simple summation of measurement scores on these discrete task performances would not add up to equivalent driving skills. An individual who is overly competent at some driving skills but woefully inadequate in others would be a poorer driver than someone whose skills were all sufficient, though their summed skill scores would be identical.

Measures typically used to assess job task performance and performance relating to the mastery of units in a curriculum typically have little bearing on how subunits interact. For any given job, life task, or individual performance, component skills in one area can compensate for deficiencies in others creating a variety of combinations of individual performance levels which could theoretically "add up to" equivalent overall performance. Thus, minimal levels of performance on individual variables (which compromise overall competence) may have little meaning by themselves. Their interactions with respect to outcomes may have far greater significance.

We are most familiar with this problem in cognitive areas of education. We are often taught language use, verbal reasoning, spatial relationship, reading comprehension, abstract reasoning, and syllogistic analysis (measured by Miller Analogies) as discrete units of curricula. Assessment of integrated

or general skills such as problem solving often do not take into account the interactive nature of skills in these subcomponent areas. Cognitive measures are used almost exclusively in assessment as if the qualities they measure did not interact, i.e., they are tested separately.

The importance of interactions, while intuitively obvious in the motor skills area, have not been carefully attended to in cognitive and social/emotional areas of assessment. Yet, once individuals have gone through a series of academic life experiences that enhance their competence in dealing with school, work, and other life experiences, the appropriate assessment task becomes that of measuring such integrated and generalized learning outcomes as the ability to cope with new problems, to find appropriate solutions, and to take the correct actions.

Measures which reflect the interdependent nature of cognitive skills essential for satisfactory functioning outside of academia have only begun to be developed.* For example, Klemp's (1974) General Integrative Model of Assessment,** incorporating a variety of independent techniques, is an approach to summative evaluation of an individual's ability to solve a problem which has as many elements and complexities of real life situations as possible. Such an assessment of individuals has the potential of coming closer to tapping real life competence than can any single test alone.

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* A recent example in the noncognitive area by McClelland and Burnham reports the importance of the interaction between levels of motivation and ego-maturity for managerial competence. (Harvard Business Review; in press.)

** This general model requires an individual to demonstrate his/her ability to integrate the following abilities: (a) to observe; (b) to extract relevant information; (c) to analyze and integrate this information; (d) to ask appropriate questions; (3) to process new information in response to such questions; (f) to utilize this information and one's knowledge in making sound and logical recommendations; (g) to develop main and contingency plans; (h) to set meaningful goals; and (i) to feed back this new information into the process for better problem analysis and solutions.

The implication for CBE is that one cannot assume that abilities or skills discretely learned will be integrated in work and life functions and consequently that establishment of minimal levels of performance on isolated skills or "sub-competencies" have much meaning in themselves. Therefore, competency research, new assessment procedures, and test instruments must focus more on the interdependence of skills. Basic research as well as empirical analysis of these interactions in various life functions is desperately needed.

Corollary 7: New attempts to define and assess learning outcomes should not be guided solely by attempts to make them functionally equivalent substitutes for traditionally assessed school achievement.

This statement should go without saying, given what has already been said about the inadequacies of traditional approaches to achievement assessment. However, the temptation to restrict the development of new measurement instruments, techniques, and procedures in order to achieve comparability with those that have gone before has great political appeal for making such innovations palatable to traditionalists. If institutional and credential reforms are to succeed, we need to move beyond the recognized limitations of traditional systems.

III

CONCLUSIONS

A. Implications for Research

The implications for research are numerous. The need may be for no less than a new psychology of competence--something on the order of Bloom's and Krathwohl's taxonomies of cognitive and affective dimensions of learning. But the emphasis must be on adult development and learning outcomes with special attention to the interactive nature of psychological variables and how skills and abilities are integrated (as life outside of academia requires). It's a tall order, but a psychology of competence is beginning to emerge.

Research by HUMRRO, ETS, Knott, McClelland, Stewart and others has already been mentioned as illustrative. Other approaches--including Norville Northcutt's survey of life skills (University of Texas, ongoing), work in Oregon (State Department of Education, ongoing), and in Syracuse by Dr. Ruth Nickse (Regional Learning Service/SURC, ongoing)--represent attempts to define performance-based learning outcomes for high school level competencies based on analysis of life skills. The Center for Applied Performance Testing represents a recent attempt to build a "catalogue" of performance-based measures. While many of these latter attempts to define and measure learning outcomes according to what people can do may be restricted in scope, lack rigor or poorly correlate with job and life requirements, these attempts represent useful beginnings.

The current state of the art in assessment, however, calls for more conceptual rigor, more systematic and comprehensive strategies for identifying, operationalizing, and developing measures for new competencies, and more empirical verification of their utility for a variety of life functions.

Until we have a more comprehensive base of empirically identified, clearly defined, and adequately measured competencies, educators will continue to use an existing array of questionable measures based on narrow cognitive outcomes or on *a priori* value-laden judgments. What is required is a reasonably sophisticated technology capable of uncovering knowledge, skills, abilities, and other characteristics which are necessary and sufficient (as well as "thorough and efficient") for competent performance.

B. Implications for Change

The heavy emphasis on empirical analysis and verification in this paper should not be taken as a denigration of educators having strong convictions about what constitutes quality education but who are unable to empirically validate these convictions. Nor is there any intention of belittling those who assess student competence on a very subjective basis (that is, "I know competence when I see it"). Clearly, there are many capable individuals in education whose judgments of others are valid and whose evaluation efforts serve students, their institutions, and society well. The plea for more empirical research suggested or implied by the issues discussed in this paper stems from the belief that such research is critical to the development of quality CBE programs that attempt large-scale change in the way we reach, teach, assess and credential students to assure them more productive and satisfying lives. Moreover, the outcomes of assessment research might well be the "prime mover" in accomplishing the changes desired by those who view CBE as a major social/educational concept responsive to so many ills inherent in our existing educational system.

CBE will not get far in the endeavor to change this sytem unless it is able to move beyond what Keeton (1974) has described as a "faddish demand for large scale school change." No matter how strongly such change is supported by those who demand equity and accountability, CBE must provide empirical evidence that it works better than the *status quo* if it is to become widely accepted. The uphill push against the existing system's

reticence to change (as in all systems) will not be sufficiently served by ideological, philosophical or polemical arguments no matter how strongly they side with equity, accountability or other broad social goals. The outcomes must speak for themselves.

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